

An additional program currently managed by TRADOC, the Army Training Information Architecture provides the means by which training management and reach to the Army Knowledge Enterprise is achieved, providing ready access to TSPs while deployed. Collectively, these programs provide the foundation of a collective training environment, overcoming the challenge inherent in multiple developers, while also significantly reducing the FCS program cost burden by taking advantage of existing investments — an estimated cost avoidance of \$300 million.

The Army still has a requirement to train as it plans to fight, but with the

expanded battlefield, increased operational tempo and personnel tempo, we must find better ways of “how” to train. A leader will have the ability to place warfighters in a blended live, virtual and constructive environment resident on their operational equipment. Executing a training event from a motor pool or assembly area will become commonplace in the future.

This exportability and tailorability is where the power of ET is realized as a force multiplier. ET will provide commanders with the ability to train their forces anytime and anywhere.

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## Benefits and Impacts of Using Tactical Sensor Payloads

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**The U.S. Army is accelerating its effort to develop and field unmanned aerial vehicles (UAVs) at the brigade, division and corps levels. This effort will enhance the Army's capability to find, identify, attack and destroy enemy troop concentrations and simultaneously reduce U.S. force vulnerability. The synthetic aperture radar/moving target indicator (SAR/MTI) sensor payload is being developed to perform UAV reconnaissance, surveillance and target acquisition (RSTA) missions.**

Product Manager Robotic and Unmanned Sensors (PM RUS), part of Project Manager Night Vision/Reconnaissance Surveillance and Target Acquisition (PM NV/RSTA) under Program Executive Officer (PEO) Intelligence, Electronic Warfare and Sensors (IEW&S), hypothesized that Army military occupational specialty (MOS) 96U, UAV operators, with minimal additional training, could effectively employ a synthetic aperture radar and moving target indicator sensor payload to perform RSTA missions. PM



TUAV Operator

RUS designed the Sensor Employment Assessment Program (SEAP) to test this hypothesis. SEAP includes

an engineering test; a military demonstration, analysis and feedback (MDAF); and an operational demonstration, analysis and feedback (ODAF). The engineering test and MDAF phases were completed in April and May 2003, respectively.

Tactical UAV Radar (TUAVR), a SAR/MTI sensor payload, developed under an advanced technology demonstration program, was installed on a Hunter UAV and configured to interface with the Hunter C-Band datalink

for the SEAP. A SEAP's engineering test phase was conducted to verify software and hardware modifications before involving soldiers in the MDAF and ODAF. A separate engineering test effort was conducted to evaluate and refine the human interface design. Imagery subject matter experts and MOS 96U soldiers from Fort Huachuca, AZ, collaborated with the radar engineers from the Northrop Grumman Corp., Electronic Systems, to develop and validate appropriate functionality for the user interface and to ensure that soldiers could operate the radar system after receiving minimal training.

The SEAP's second phase — the MDAF — required soldiers to employ a SAR/MTI package to detect and classify stationary targets and detect moving targets while conducting RSTA missions in a tactical environment. The MDAF's purpose was to:

- Provide a SAR/MTI package that could be used and appraised by military users.
- Determine the SAR/MTI sensor payload's military utility while conducting RSTA missions during tactical operations.
- Assess and validate PM RUS-developed tactics, techniques and procedures (TTPs) for SAR/MTI sensor payload employment.

The MDAF was controlled from the division tactical operations center (DTOC) located in the Electronic Proving Ground Instrumented Test Range Central Control Facility at Fort Huachuca. The launch and recovery Ground Control Station (GCS) — and backup GCS — were located at Libby Army Airfield. The backup GCS was also used to control the Hunter UAV

with the electro-optical and infrared (EO/IR) sensor payload onboard during cross-cueing missions. The Sup- portable Ground Control Station containing the Radar Ground Support Equipment (RGSE) was located in the parking lot adjacent to the DTOC.



The Hunter UAV

The scenarios developed for the MDAF assessment portrayed a threat force similar to one that might be encountered during a small-scale contingency operation. The missions the operators were required to conduct were:

- Area, route and zone reconnaissance
- Surveillance missions
- Urban area reconnaissance

The RGSE and DTOC computers were on a local area network that was configured with e-mail and a Web server. Size, activity, location, unit, time and equipment (SALUTE) reports with attached National Imagery Transmission Format imagery were e-mailed from the Mission Payload Operator (MPO) to the G2, G3 and 96D Imagery Analyst within the DTOC using the automated SALUTE report dialog boxes available with the RGSE software. The 96U indicated in the SALUTE report's equipment line whether he thought the target was a wheeled or tracked vehicle. An MOS 96D used RemoteView software to further exploit the SAR image so that 96U and 96D capabilities could be compared and assessed.

The 96U MPO was given a fragmentary order for each mission to search

an area of interest and to detect and classify stationary targets and detect moving targets. This guidance was based on mission-driven intelligence preparation of the battlefield that included named areas of interest, targeted areas of interest and decision points. In one scenario, a 96U MPO operating the TUAVR detected and reported four M60 tanks and a

5-ton truck as five stationary vehicles. This same MPO then directed another MPO operating an EO/IR sensor payload onboard another Hunter UAV who was cross-cued to the location of the detections. The EO/IR MPO quickly recognized and reported the detected targets as tanks and a cargo truck. A second mission resulted in the SAR/MTI MPO detecting four stationary M577 armored personnel carriers arranged in a tactical operations center configuration. The MPO reported them as four vehicles and sent the SALUTE report to the DTOC. A 96D then used RemoteView software to further exploit the image sent by the MPO with the SALUTE report. He correctly classified the targets as four tracked vehicles.

SFC Gary Torre, a test participant, stated he believed that "the SAR/MTI payload will give battlefield commanders the additional situational awareness when the EO/IR payload is deemed usable because of weather or smoke coverage. Also, the ability to use the MTI package to cue an EO/IR payload will give the commander the ability to cover more area more swiftly than with the EO/IR solely as the only asset."

Another difficult mission was conducted in an urban environment simulation at Fort Huachuca. The MPOs were given a target list consisting of a DTOC, logistics convoy, three different motor pools, command and control aircraft, fuel point, power substation, tank platoon and command post. The MPO successfully detected and reported the DTOC, which consisted of several tents and vehicles. Then, a 96D used RemoteView software to further exploit the image sent by the MPO. He correctly located the tents and vehicles.

The MDAF provided a reliable, supportable SAR/MTI package. The MDAF demonstrated the SAR/MTI sensor payload's military utility while

conducting tactical RSTA missions. The TTPs for the employment of this payload were reviewed, revised and documented. The information and lessons learned through the MDAF will influence the Army's SAR/MTI sensor payload employment for many years to come. Initial MDAF results support PM RUS's expectations that Army UAV operators — with minimal additional training — can effectively employ a SAR/MTI sensor payload to perform RSTA missions.

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## FCS Unattended Ground Sensors

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**The Future Combat Systems (FCS) Unattended Ground Sensors (UGS) will provide remote sensing capabilities to enhance the Objective Force commander's intelligence picture. The remotely deployable UGS is an integral component of the FCS-layered sensor network and will provide enhanced threat warning, situational awareness (SA) and force protection in both tactical and urban environments for extended periods. The sensor family will be self-webbing, self-healing and network-capable for target detection, location, tracking and identification.**

The FCS UGS program is divided into two major subgroups of sensing systems: Tactical-UGS (T-UGS), which includes Intelligence, Surveillance and Reconnaissance (ISR)-UGS and Chemical, Biological, Radiological and Nuclear (CBRN)-UGS; and Urban-UGS (U-UGS), also known as Urban Military Operations in Urban Terrain (MOUT) Advanced Sensor System. The ISR-UGS will be modular and

composed of tailorable sensor groups using multiple ground-sensing technologies. A UGS field will include low-cost, expendable and multimode sensors for target detection, location and classification; and an imaging capability for target identification. A sensor field will also include a gateway node to provide sensor fusion and long-haul communications capability for transmitting target or other information to a remote operator

or the common operating picture through the FCS Unit of Action (UA) Network. The UGS can be used to perform mission tasks such as perimeter defense, surveillance, target acquisition and SA, including CBRN early warning.

U-UGS will provide a leave-behind, network-enabled reporting system for SA and force protection in an urban setting, as well as residual protection for cleared areas of MOUT environments. They can be hand-employed by Soldiers or by robotic vehicles inside and outside buildings and structures as depicted in the figure on Page 40.

### Program Management Approach

Unique among FCS core systems, the FCS-UGS program will be co-managed